WHAT IS CLAIMED IS:

1. A high-speed turbo decoder using a BCJR (Bahl, Cocke, Jelinek, and Raviv) algorithm or a BCJR algorithm which makes approximation by ACS (Add-Compare-Select) computation, comprising, in order to perform at least one of alpha metric computation and beta metric computation in the BCJR algorithm:

means for supplying a plurality of pipelined stages of gamma metrics;

ACS computation means constituted of a plurality of stages of cascade connections which receives the plurality of pipelined gamma metrics;

means for receiving a computation result obtained by said ACS computation means and thereby updating state metrics every plurality of stages (K stages); and

means for storing state metrics for every K stages.

2. A decoder according to claim 1, wherein said state metric updating means is of a sliding window type, and state metrics are stored in a window for every K stages.

3. A high-speed turbo decoder using a BCJR (Bahl, Cocke, Jelinek, and Raviv) algorithm or a BCJR algorithm which makes approximation by ACS (Add-Compare-Select) computation, comprising, in order to perform at least one of alpha metric computation and beta metric computation in

the BCJR algorithm:

means for supplying a plurality of pipelined stages of gamma metrics;

ACS computation means constituted of a plurality of stages of cascade connections which receives the plurality of pipelined gamma metrics;

means for receiving a computation result obtained by said ACS computation means and thereby updating state metrics every plurality of stages (K stages); and

another ACS computation means constituted of a plurality of stages of cascade connections which receives state metric updating results for every K stages and a plurality of pipelined stages of gamma metrics,

wherein likelihood computation is performed on the basis of a computation result obtained by each stage of said ACS computation means constituted of the cascade connections.

4. A decoder according to claim 3, wherein computation results obtained by the respective stages of said another ACS computation means constituted of a plurality of cascade connections which receives state metric updating results for every K stages and gamma metrics at the plurality of pipelined stages are computation results on state and gamma metrics used in the ACS computation, and thereby performing likelihood

computation on the basis of the computation results.

5. A high-speed turbo decoder using a BCJR (Bahl, Cocke, Jelinek, and Raviv) algorithm or a BCJR algorithm which makes approximation by ACS (Add-Compare-Select) computation, comprising, in order to perform at least one of alpha metric computation and beta metric computation in the BCJR algorithm:

means for receiving values of stored state metrics for every plurality of stages (K stages) as first inputs and thereby supplying a plurality of pipelined stages of gamma metrics; and

ACS computation means constituted of a plurality of stages of cascade connections which receives the plurality of pipelined stages of gamma metrics as second inputs,

wherein likelihood computation is performed on the basis of computation results at the respective stages of said ACS computation means constituted of the cascade connections.

6. A high-speed turbo decoder using a BCJR (Bahl, Cocke, Jelinek, and Raviv) algorithm or a BCJR algorithm =which makes approximation by ACS (Add-Compare-Select) computation, comprising:

(a) a first section including, in order to perform at least one of alpha metric computation and beta metric computation in the BCJR algorithm:

means for supplying a plurality of pipelined stages of gamma metrics;

ACS computation means constituted of a plurality of stages of cascade connections which receives the plurality of pipelined stages of gamma metrics;

means for receiving computation results obtained by said ACS computation means and thereby updating state metrics every plurality of stages (K stages); and

means for storing the state metrics for every plurality of stages,

(b) a second section including, in order to perform the other one of alpha metric computation and beta metric computation in the BCJR algorithm:

means for supplying a plurality of pipelined stages of gamma metrics;

ACS computation means constituted of a plurality of stages of cascade connections which receives the plurality of pipelined stages of gamma metrics;

means for receiving computation results obtained by said ACS computation means and thereby updating state metrics every plurality of stages (K stages); and

another ACS computation means constituted of a plurality of stages of cascade connections which

receives state metric updating results for every K stages and the plurality of pipelined stages of gamma metrics;

wherein a computation result in each stage of said another ACS computation means constituted of the cascade connections becomes a first input for likelihood computation;

and

(c) a third section including:

means for supplying a plurality of pipelined stages of gamma metrics; and

still another ACS computation means constituted of a plurality of stages of cascade connections which receives values of the stored state metrics for every K stages as first inputs and receives the plurality of pipelined stages of gamma metrics as second inputs;

wherein a computation result in each stage of said still another ACS computation means constituted of the cascade connections becomes a second input for likelihood computation,

thus the likelihood computation is performed while the first and second inputs for the likelihood computation are synchronized with each other by using delay means.

7. A decoder according to claim 1, wherein out of

plural stages of computations by said ACS computation means constituted of the plurality of stages of cascade connections, computation at a first stage becomes addition, and a second and subsequent stages become computations each constructed by a trellis structure constituted of parallel components.

8. A decoder according to claim 2, wherein out of plural stages of computations by said ACS computation means constituted of the plurality of stages of cascade connections, computation at a first stage becomes addition, and a second and subsequent stages become computations each constructed by a trellis structure constituted by parallel components.

9. A decoder according to claim 1, wherein said means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

10. A decoder according to claim 2, wherein said

means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

11. A decoder according to claim 7, wherein said means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

12. A decoder according to claim 3, wherein out of plural stages of computations by said ACS computation means constituted of the plurality of stages of cascade connections which receives the plurality of pipelined

stages of gamma metrics, computation at a first stage becomes addition, and a second and subsequent stages become computations by said ACS computation means each constructed by a trellis structure constituted of parallel components.

13. A decoder according to claim 4, wherein out of plural stages of computations by said ACS computation means constituted of the plurality of stages of cascade connections which receives the plurality of pipelined stages of gamma metrics, computation at a first stage becomes addition, and a second and subsequent stages become computations by said ACS computation means each constructed by a trellis structure constituted of parallel components.

14. A decoder according to claim 3, wherein said means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

15. A decoder according to claim 4, wherein said means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

16. A decoder according to claim 12, wherein said means for updating the state metrics every plurality of stages (K stages) is adapted to receive computation results, as first inputs, sent from all nodes indicating states before updating to the respective nodes indicating states after updating and receive computation results obtained by said ACS computation means, as second inputs, constituted of the plurality of stages of cascade connections, whereby ACS computation based on inputs corresponding to the number of nodes indicating states is performed.

17. A decoder according to claim 1, wherein a parallel concatenation encoding method is used as a turbo code encoding method.

18. A decoder according to claim 3, wherein a parallel concatenation encoding method is used as a turbo code encoding method.

19. A decoder according to claim 5, wherein a parallel concatenation encoding method is used as a turbo code encoding method.

20. A decoder according to claim 6, wherein a parallel concatenation encoding method is used as a turbo code encoding method.

21. A decoder according to claim 1, wherein a series concatenation encoding method is used as a turbo code encoding method.

22. A decoder according to claim 3, wherein a series concatenation encoding method is used as a turbo code encoding method.

23. A decoder according to claim any one of claims 5 to 10, wherein a series concatenation encoding method is used as a turbo code encoding method.

24. A decoder according to claim 6, wherein a series concatenation encoding method is used as a turbo code encoding method.

25. A decoder according to claim 1, wherein in the ACS computation, correction values based on a Jacobian logarithm are added.

26. A decoder according to claim 3, wherein in the

ACS computation, correction values based on a Jacobian logarithm are added.

27. A decoder according to claim 5, wherein in the ACS computation, correction values based on a Jacobian logarithm are added.

28. A decoder according to claim 6, wherein in the ACS computation, correction values based on a Jacobian logarithm are added.